

# Claims

- [c1] A MRI system including a scanning unit adapted to generate a parallel scan comprising:  
a substantially cylindrical member defining a scanning bore; and  
a RF coil assembly mounted in said scanning bore, said RF coil assembly comprises a TEM surface resonator array.
- [c2] A MRI system as in claim 1 further comprising a static magnet structure comprising a superconducting magnet having a plurality of superconducting magnetic field coils adapted to generate a temporally constant magnetic field along a longitudinal axis of said scanning bore.
- [c3] A MRI system as in claim 1 wherein said TEM surface resonator comprises a cylinder, said cylinder is capped off with a first annular member at a front and a second annular member at a back end of cylinder, said first annular member includes a first bolt circle with a first plurality of equally-spaced apertures and said second annular member includes a second bolt circle with a second plurality of equally-spaced apertures, said first plurality of apertures adapted to receive a first end of a first con-

ductive rod, said second plurality of apertures adapted to receive a second end of said first conductive rod such that said first conductive rod extends between said first and said second annular members.

- [c4] A MRI system as in claim 3 wherein said TEM surface resonator is substantially semi-circular.
- [c5] A MRI system as in claim 3 wherein said cylinder includes an inner tubular member with an external shield attached to an outer circumferential surface thereof, wherein said inner tubular member comprises insulating material including fiberglass or molded polyurethane.
- [c6] A MRI system as in claim 3 wherein said external shield comprises a thin conductive sheath of flexible circuit board material.
- [c7] A MRI system as in claim 3 wherein said annular member comprises a rigid circuit board material.
- [c8] A MRI system as in claim 3 wherein said first conductive rod is resonated by means of at least one fixed capacitor to form a configuration of a low pass pi circuit, said first conductive rod also fitted with a standard preamp decoupling circuitry, wherein inter-element cross-talk is at least 10 dB for a nearest neighbor.

- [c9] A MRI system as in claim 3 further comprising at least one lumped element capacitor adapted to compensate for an inductance of said first conductive rod.
- [c10] A MRI system as in claim 8 wherein said at least one capacitor includes a commercially available lumped element capacitor including a surface mounted capacitor or a porcelain chip capacitor.
- [c11] A MRI system as in claim 1 wherein said TEM surface resonator includes unconstrained element reactances.
- [c12] A method for MRI scanning comprising:  
generating a parallel scan;  
scanning an object;  
receiving said parallel scan in a TEM surface resonator;  
and  
reconstructing an image of said object.
- [c13] A method as in claim 12 further comprising demodulating magnetic resonance signals emanating from an examined portion of said object.
- [c14] A MRI system comprising:  
a scanning unit adapted to generate a parallel scan;  
a substantially cylindrical member defining a scanning bore;  
a RF coil assembly mounted in said scanning bore, said

RF coil assembly comprising a TEM surface resonator, said TEM surface resonator adapted to receive said parallel scan, said TEM surface resonator further adapted to generate an image signal; and an image reconstruction device adapted to receive said image signal.

[c15] A MRI system as in claim 14 wherein said TEM surface resonator comprises a portion of a cylinder, said cylinder is capped off with a first annular member at a front and a second annular member at a back end of cylinder, said first annular member includes a first bolt circle with a first plurality of equally-spaced apertures and said second annular member includes a second bolt circle with a second plurality of equally-spaced apertures, said first plurality of apertures adapted to receive a first end of a first conductive rod, said second plurality of apertures adapted to receive a second end of said first conductive rod such that said first conductive rod extends between said first and said second annular members.

[c16] A MRI system as in claim 15 wherein said cylinder includes an inner tubular member with an external shield attached to an outer circumferential surface thereof, wherein said inner tubular member comprises insulating material including fiberglass or molded polyurethane.

- [c17] A MRI system as in claim 15 wherein said external shield comprises a thin conductive sheath of flexible circuit board material.
- [c18] A MRI system as in claim 15 wherein said annular member comprises a rigid circuit board material.
- [c19] A MRI system as in claim 15 wherein said first conductive rod is resonated by means of at least one fixed capacitor to form a configuration of a low pass pi circuit, said first conductive rod also fitted with a standard preamp decoupling circuitry, wherein inter-element cross-talk is at least 10 dB for a nearest neighbor.
- [c20] A MRI system as in claim 15 further comprising at least one lumped element capacitor adapted to compensate for an inductance of said first conductive rod.